CLAIMS

What is claimed is:

1. A method for performing bit loading in a multicarrier communication system, comprising:

obtaining transmission coefficients α_n for subchannels of a multicarrier channel, where n is a subchannel index;

calculating initial cost values for said subchannels using said transmission coefficients;

identifying a subchannel $\underline{n}$ having a lowest cost value;

allocating a new bit to said identified subchannel $\underline{n}$; and

updating said cost value of said identified subchannel $\underline{n}$, after allocating a new bit, using a cost function:

$$\Delta P_n = f(C_n) - g(\alpha_n)$$

where C_n is a number of bits allocated to a subchannel n, $f(C_n)$ is a function of C_n that returns a baseline cost value for allocating an additional bit to subchannel n, and $g(\alpha_n)$ is a function of transmission coefficient α_n.

2. The method of claim 1, further comprising:

repeating identifying, allocating, and updating for a total of R iterations, where R is a number of bits to be allocated.

3. The method of claim 1, wherein:

said function $g(\alpha_n)$ is equal to $\log(\alpha_n^2)$, which is the logarithm of the square of the channel coefficient of subchannel n.

4. The method of claim 1, wherein:

updating said cost value includes retrieving a value for $f(C_{\underline{n}})$ from a first lookup table.

5. The method of claim 1, wherein:

updating said cost value includes retrieving a value for $g(\alpha_{\underline{n}})$ from a second lookup table.

6. The method of claim 1, wherein:

calculating initial cost values includes evaluating the cost function:

$$\Delta P_n = f(0) - \log(\alpha_n^2)$$

for each subchannel, where $f(0)$ is a baseline cost value assuming no allocated bits for a subchannel n and $\log(\alpha_n^2)$ is the logarithm of the square of the channel coefficient of subchannel n.

7. The method of claim 6, wherein:

calculating initial cost values includes retrieving a value for $f(0)$ from a first lookup table.

8. The method of claim 6, wherein:

calculating initial cost values includes retrieving values for $\log(\alpha_n^2)$ from a second lookup table for subchannels of said multicarrier channel.

9. The method of claim 1, wherein:

obtaining transmission coefficients includes acquiring said transmission coefficients from a local channel estimator.

10. The method of claim 1, wherein:

obtaining transmission coefficients includes receiving said transmission coefficients from a remote communication entity.

11. An apparatus comprising:

a channel determination unit to obtain transmission coefficients α_n for subchannels of a multicarrier channel;

a bit allocation calculator to determine bit allocations for said subchannels of said multicarrier channel using said transmission coefficients, said bit allocation calculator to calculate cost values for said subchannels as a difference between a first function and a second function;

a first lookup table to store and retrieve values of said first function for use by said bit allocation calculator; and

a second lookup table to store and retrieve values of said second function for use by said bit allocation calculator.

12. The apparatus of claim 11, wherein:

said first function is a function that returns a threshold cost of allocating an additional bit to a subchannel based on a presently allocated number of bits.

13. The apparatus of claim 11, wherein:

said second function is a function that returns a logarithm of a square of a transmission coefficient for a corresponding subchannel.

14. The apparatus of claim 11, wherein:

said channel determination unit is a channel estimator to estimate said transmission coefficients using training signals received via said multicarrier channel.

15. The apparatus of claim 11, wherein:

said bit allocation calculator is operative to: calculate initial cost values for said subchannels of said multicarrier channel assuming zero bits allocated to each subchannel, identify a subchannel with a lowest cost value, allocate an additional bit to said identified subchannel, and update a cost value of said identified subchannel using information from said first and second lookup tables.

16. The apparatus of claim 15, wherein:

said bit allocation calculator is operative to: identify a subchannel with a lowest cost value, allocate an additional bit to said identified subchannel, and update a cost value of said identified subchannel using information from said first and second lookup tables for each bit to be included within a multicarrier symbol.

17. The apparatus of claim 11, wherein:

said multicarrier channel is an orthogonal frequency division multiplexing (OFDM) channel.